

Articulating conservation outcomes for Citizen Science: Emerging principles and practices for the 21st century

Tina Phillips, Cornell Lab of Ornithology
Evaluation Program Manager
tina.phillips@cornell.edu

*NOAA Brown Bag Seminar
Washington D.C., January 29, 2014*

birds.cornell.edu



*A membership institution interpreting and conserving the earth's biological diversity through research, education, and **citizen science** focused on birds*

Goal for this

- 1) To broaden our view of "conservation outcomes" within citizen science
- 2) Illustrate exemplar citizen science projects influencing conservation
- 3) Describe ways to improve our conservation efforts

Citizen Science

Members of the public and professional scientists
engaged in collaborative research
to generate new science-based knowledge



Also Known As ...

participatory action research

Community-based
monitoring

community
science

civic science

volunteer monitoring

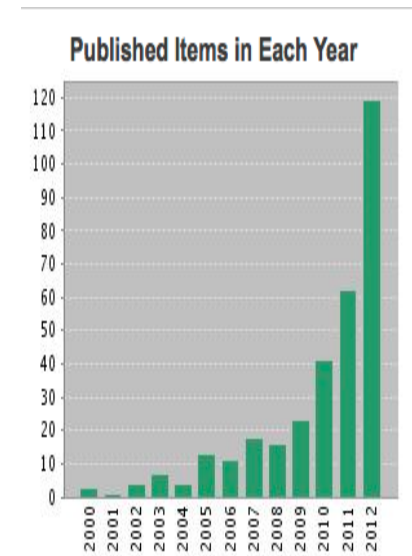
local and traditional knowledge

public participation in scientific
research

Current State of Citizen

Growing interest in citizen science

- International conferences
- Special issues in leading journals
- 1200+ papers using CS data
- White House Champions of Change



Growing need for measuring/ documenting the impacts of PPSR

- Scientific outcomes – check
- Education outcomes – in progress
- Conservation...?

 **Evaluation**

Evaluation is .

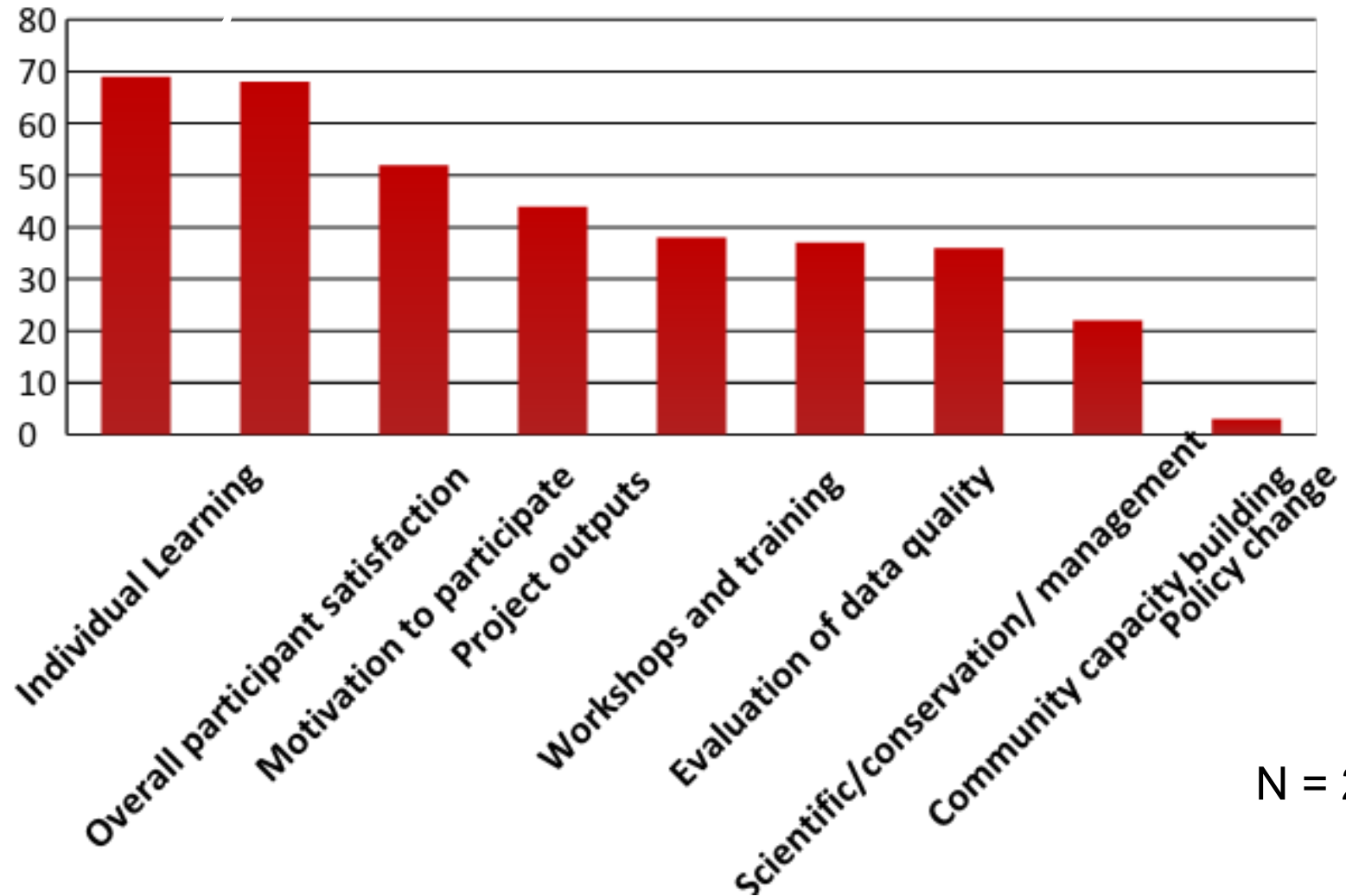
the systematic collection of data
to determine strengths and weaknesses
of programs, policy, products, so as to
improve their overall effectiveness.

Assessment

Stated Goals of Citizen Science



Outcomes Evaluated across Projects



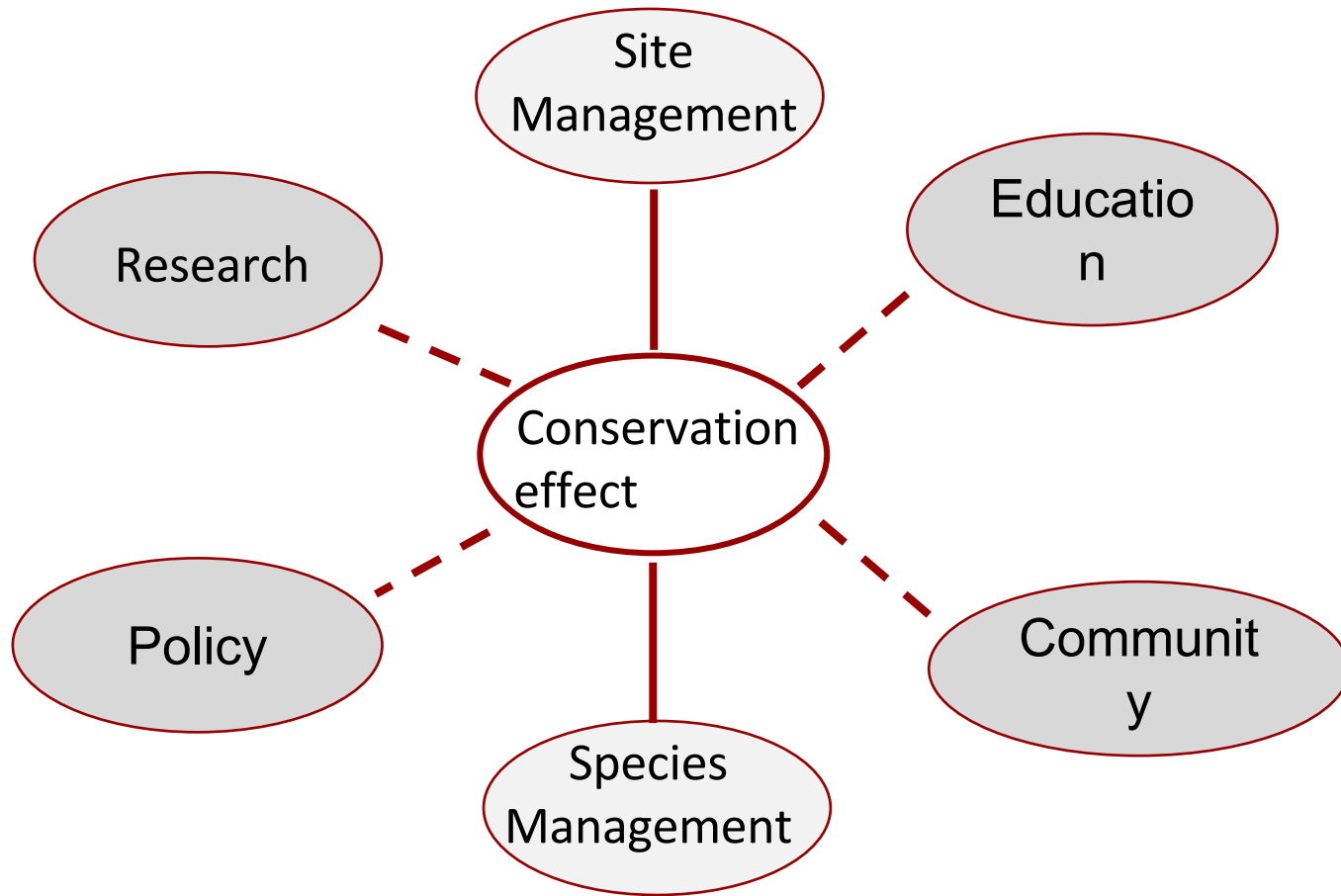
N = 200

Fundamental Questions

- **What should our conservation goals be and how do we measure progress in reaching them?**
- How can we most effectively take action to achieve conservation?
- How can we do conservation better?

Salafsky et al. 2002, Conservation Biology

Evaluation of Conservation Activities



Adapted from Kapos et al. 2008

Educational

Framework for Evaluating Learning Outcomes



Citizenscience.org



DEVISE

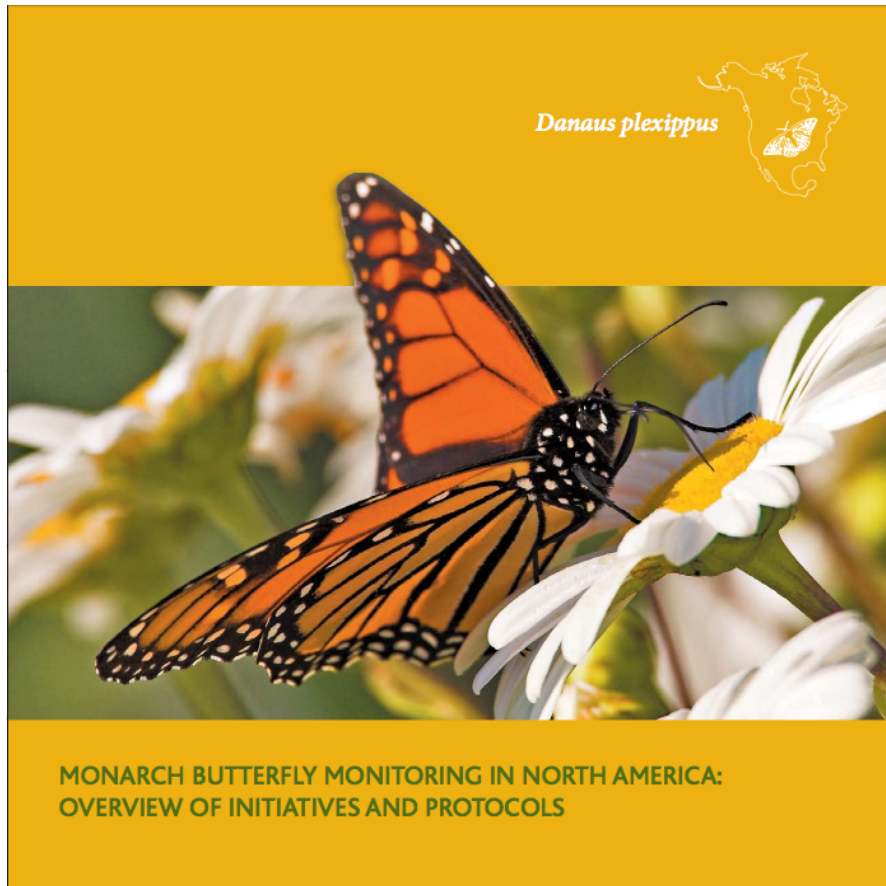
- Interest in Science and Nature (adult version)
- Interest in Science and Nature (youth version)
- Nature Relatedness Scale*
- Self-Efficacy for Science*
- Self-Efficacy for Environmental Action*
- Motivation for Science*
- Motivation for Environmental Action*
- Perceptions of Science Scale
- Skills of Science Self-Report*
- Data Interpretation Quiz
- General Environmental Stewardship Scale
- Behavioral Intention Scale*

**customizable*



Monarch Larva Monitoring

MLMP Volunteers: Advocates for Monarch Conservation



"Lots of stories but not enough time right now. Have to get milkweed seeds ready to give away at Purdue's Bug Bowl."

Since being involved in the MLMP, volunteers have protected their monarch sites by placing land in preserves, easements, or trusts to ensure it will stay a monarch habitat rather than fall victim to development. Volunteers have also protected monarch habitat by influencing policy makers and land managers to change practices, such as mowing, limiting pesticide and herbicide use, and invasive plant removal.

Results of the survey demonstrated that MLMP volunteers not only contribute to long-term data collection, but they also take direct actions to conserve the monarch butterfly in its larval stage as well as its amazing migration. We're thrilled that MLMP volunteers are becoming active voices for monarchs in their communities!

The Great Sunflower Project

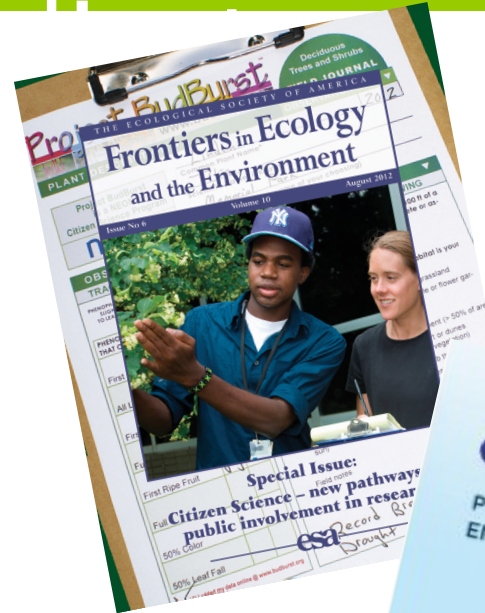
Pollinator Habitat Challenge

- Habitat Pollinator pilot study pre assessment
- Participants given a “habitat score”
- Habitat Pollinator pilot study post assessment
- Compare data from pre/post habitat assessment
- Do habitat assessments differ pre-post?
- Are more bees reported this year vs. last year?



Research

- Publications
- Evaluation of data quality
- New technologies
- Accessibility and utility of data
- Increased understanding of natural systems
- Data informing management decisions, regulations
- Early detection
- Interdisciplinary collaborations
- Grad students, dissertations



- *140 million observations*
- *Global*
- *99% of all known sp. reported*





Northern Pintail: Fall probability (STEM)




Low

High

 Agricultural Lands

 Protected Areas

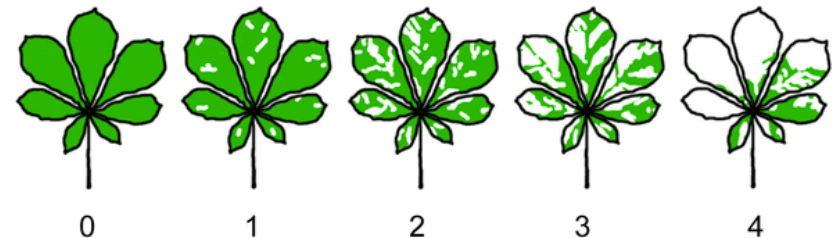
 Refuge Complex

Hypothesis-driven project

- Relationship between damage to the trees and length of time the moth (*Cameraria ohridella*) had been in an area.
- Relationship between rate of predation of the leaf-miner by parasitic wasps and time that the moth had been present.
- Participant's data was accurate in all but one case.



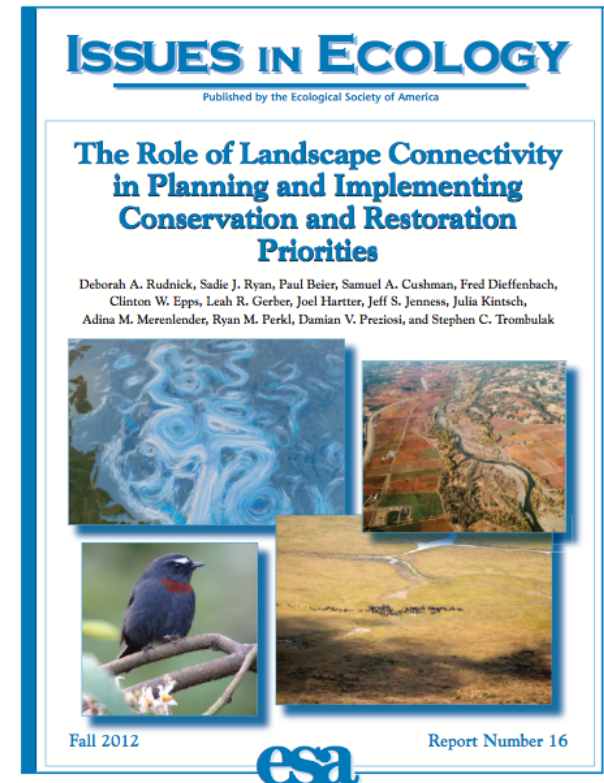
Leaf-miner moth



Pocock MJO, Evans DM (2014) The Success of the Horse-Chestnut Leaf-Miner, *Cameraria ohridella*, in the UK Revealed with Hypothesis-Led Citizen Science. *PLoS ONE* 9(1): e86226. doi:10.1371/journal.pone.0086226

Policy Indicators

- Inclusion of local expertise
- Utility of data
- Time to decision
- Local capacity building
- Policies and management plans
- Legislation passed
- Enforcement and adoption of plans, legislation, etc.



Adapted from Danielsen et al. 2008, Conservation Biology

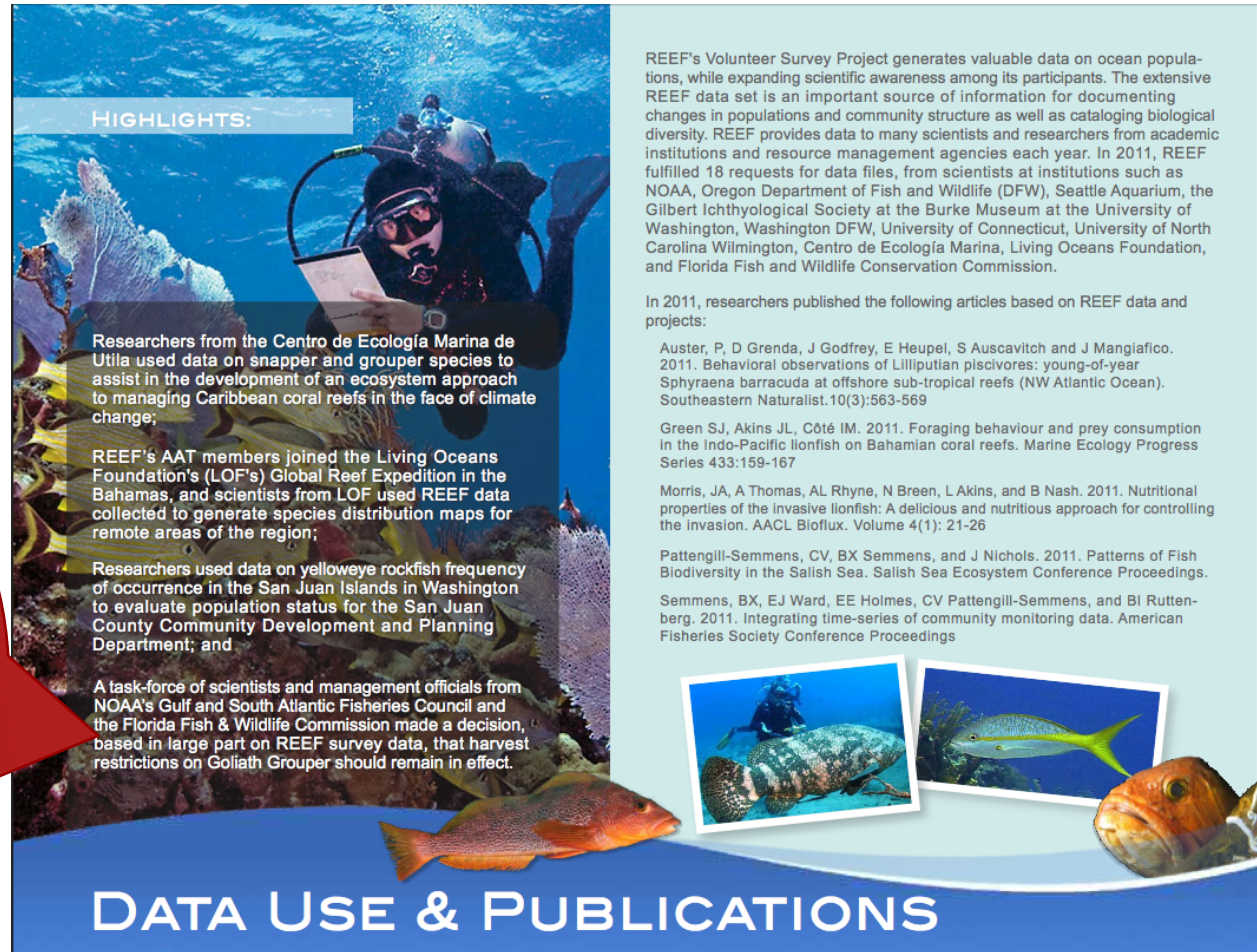


By collaborating with citizens, natural resource management agencies and environmental organizations, COASST works to translate long-term monitoring into effective marine conservation solutions.

REEF

(Reef Environmental Education Foundation)

A task force of scientists and management officials from NOAA's Gulf and South Atlantic Fisheries and the Florida Fish & Game Commission made a decision based in large part on REEF survey data, that harvest restrictions on Goliath Grouper should remain in effect.



HIGHLIGHTS:

Researchers from the Centro de Ecología Marina de Utila used data on snapper and grouper species to assist in the development of an ecosystem approach to managing Caribbean coral reefs in the face of climate change;

REEF's AAT members joined the Living Oceans Foundation's (LOF's) Global Reef Expedition in the Bahamas, and scientists from LOF used REEF data collected to generate species distribution maps for remote areas of the region;

Researchers used data on yelloweye rockfish frequency of occurrence in the San Juan Islands in Washington to evaluate population status for the San Juan County Community Development and Planning Department; and

A task-force of scientists and management officials from NOAA's Gulf and South Atlantic Fisheries Council and the Florida Fish & Wildlife Commission made a decision, based in large part on REEF survey data, that harvest restrictions on Goliath Grouper should remain in effect.

REEF's Volunteer Survey Project generates valuable data on ocean populations, while expanding scientific awareness among its participants. The extensive REEF data set is an important source of information for documenting changes in populations and community structure as well as cataloging biological diversity. REEF provides data to many scientists and researchers from academic institutions and resource management agencies each year. In 2011, REEF fulfilled 18 requests for data files, from scientists at institutions such as NOAA, Oregon Department of Fish and Wildlife (DFW), Seattle Aquarium, the Gilbert Ichthyological Society at the Burke Museum at the University of Washington, Washington DFW, University of Connecticut, University of North Carolina Wilmington, Centro de Ecología Marina, Living Oceans Foundation, and Florida Fish and Wildlife Conservation Commission.

In 2011, researchers published the following articles based on REEF data and projects:

Auster, P, D Grenda, J Godfrey, E Heupel, S Auscavitch and J Mangialfico. 2011. Behavioral observations of Lilliputian piscivores: young-of-year *Sphyrna barracuda* at offshore sub-tropical reefs (NW Atlantic Ocean). *Southeastern Naturalist*.10(3):563-569

Green SJ, Akins JL, Côté IM. 2011. Foraging behaviour and prey consumption in the Indo-Pacific lionfish on Bahamian coral reefs. *Marine Ecology Progress Series* 433:159-167

Morris, JA, A Thomas, AL Rhyne, N Breen, L Akins, and B Nash. 2011. Nutritional properties of the invasive lionfish: A delicious and nutritious approach for controlling the invasion. *AACL Bioflux*. Volume 4(1): 21-26

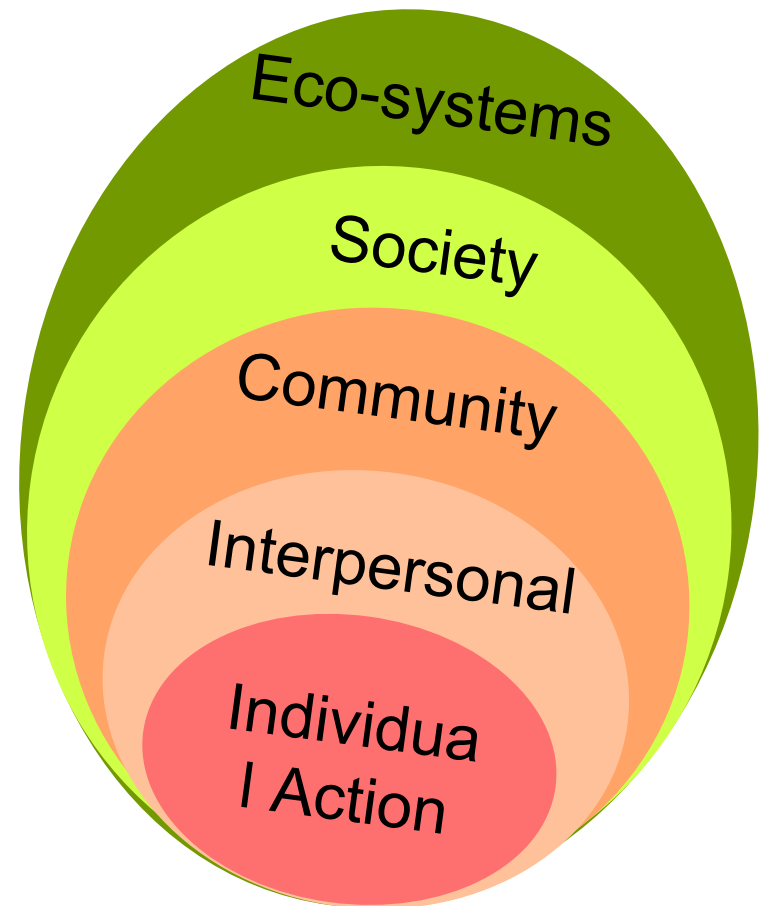
Pattengill-Semmens, CV, BX Semmens, and J Nichols. 2011. Patterns of Fish Biodiversity in the Salish Sea. *Salish Sea Ecosystem Conference Proceedings*.

Semmens, BX, EJ Ward, EE Holmes, CV Pattengill-Semmens, and BI Ruttenberg. 2011. Integrating time-series of community monitoring data. *American Fisheries Society Conference Proceedings*

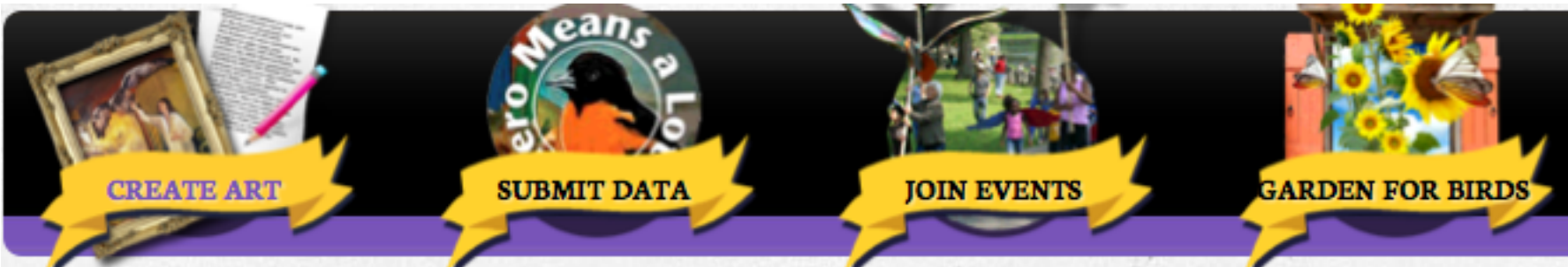
DATA USE & PUBLICATIONS

Community-based

- Community buy-in and support
- Social capital
- Economic impacts
- Environmental justice
- Increased trust
- Co-adaptive management
- Disaster and conflict resiliency



Celebrate Urban Birds



Sea turtle conservation



Fundamental Questions

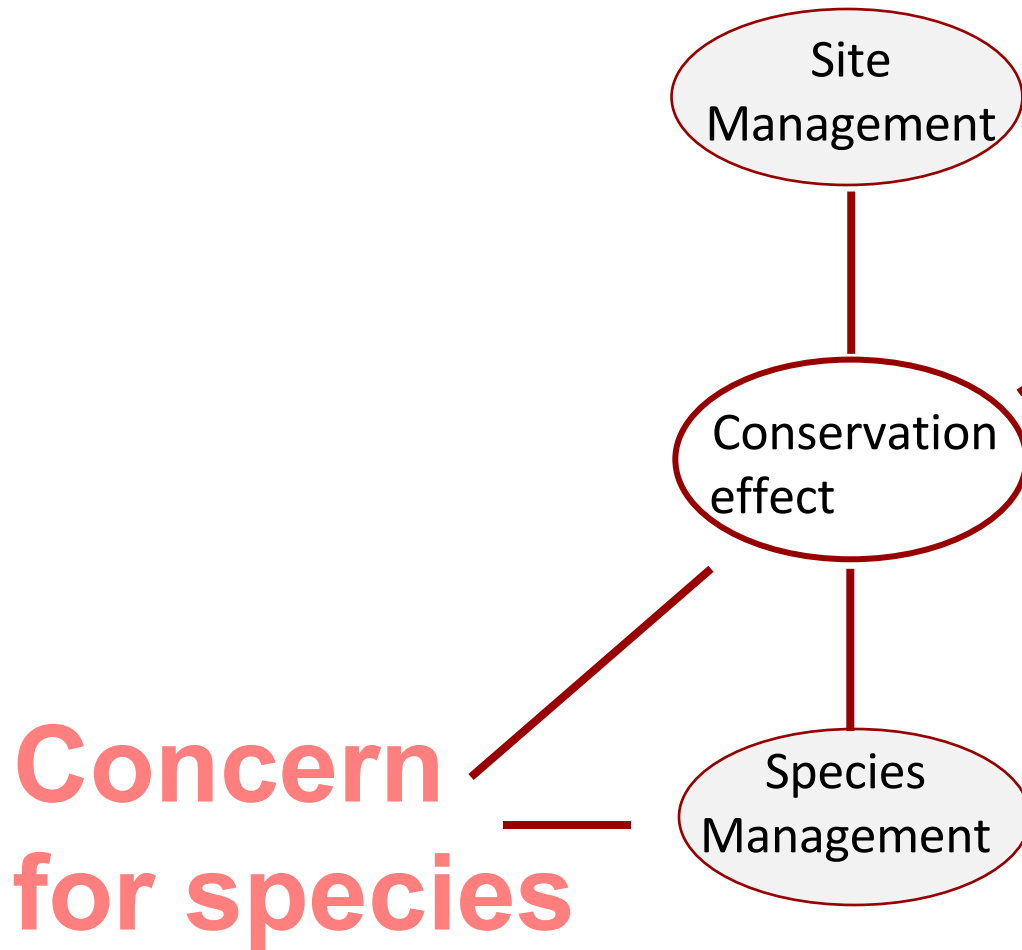
- What should our conservation goals be and how do we measure progress in reaching them?
- **How can we most effectively take action to achieve conservation?**
- How can we do conservation better?

Salafsky et al. 2002, Conservation Biology

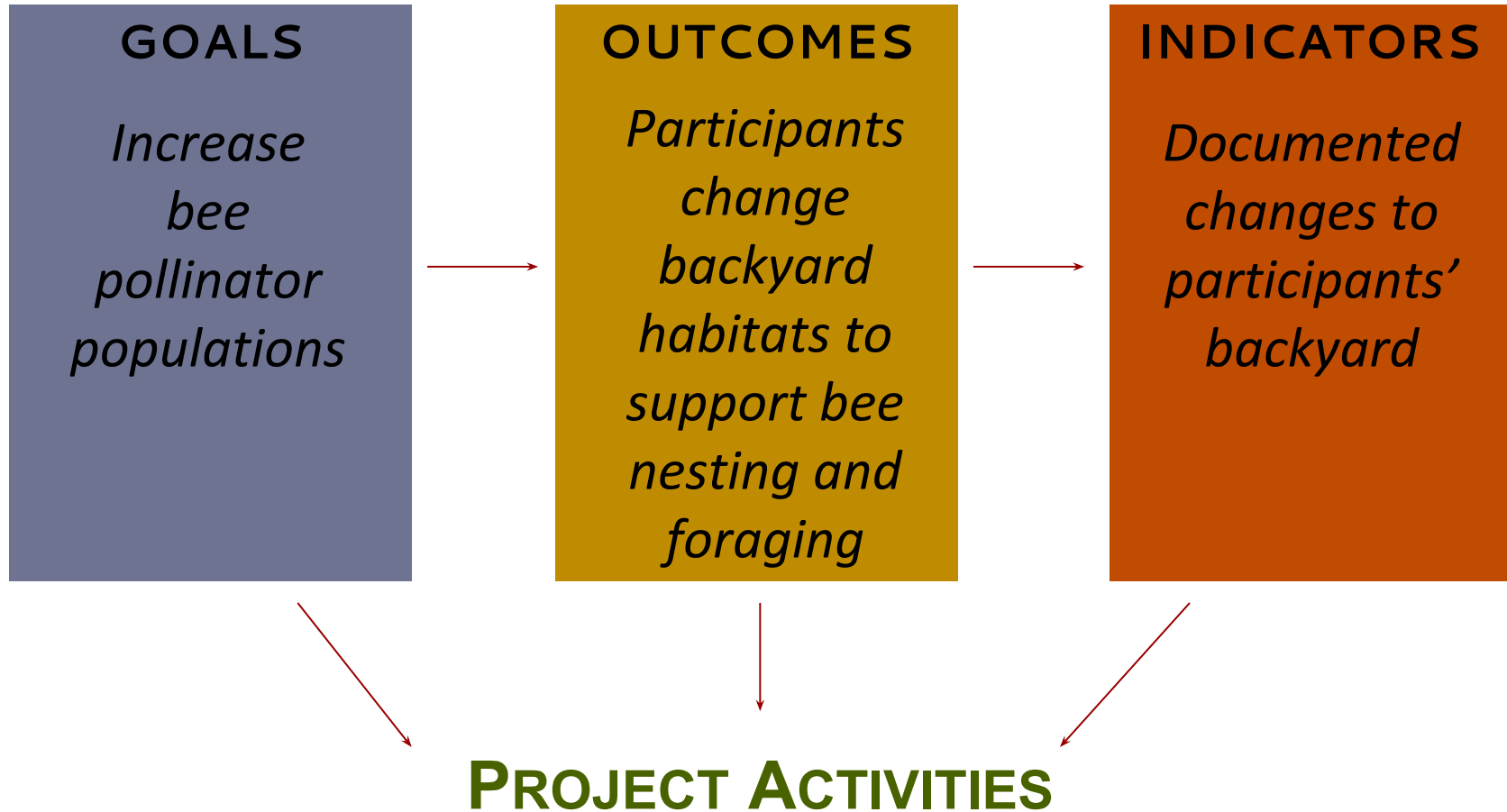
Tap into

Motivations

**SENSE OF
PLACE**



Goals, Outcomes, &



Articulate Program

TI

Inputs

- Project team
- Materials
- Infrastructure
- Partners
- Funding

Activities

- Learn protocol
- Observe
- Collect data
- Submit data
- Communicate with others
- Explore data

Outputs

- Publicly accessible data
- Data visualization tools
- Volunteer effort/hours
- Exposure to science

Outcomes

- Increased capacity for youth dev.
- Expanded community network & learning opps
- Increased knowledge of best practices

Impacts

- Increased social capital
- Improved relationships with science orgs/NGOs
- Improved habitat for birds



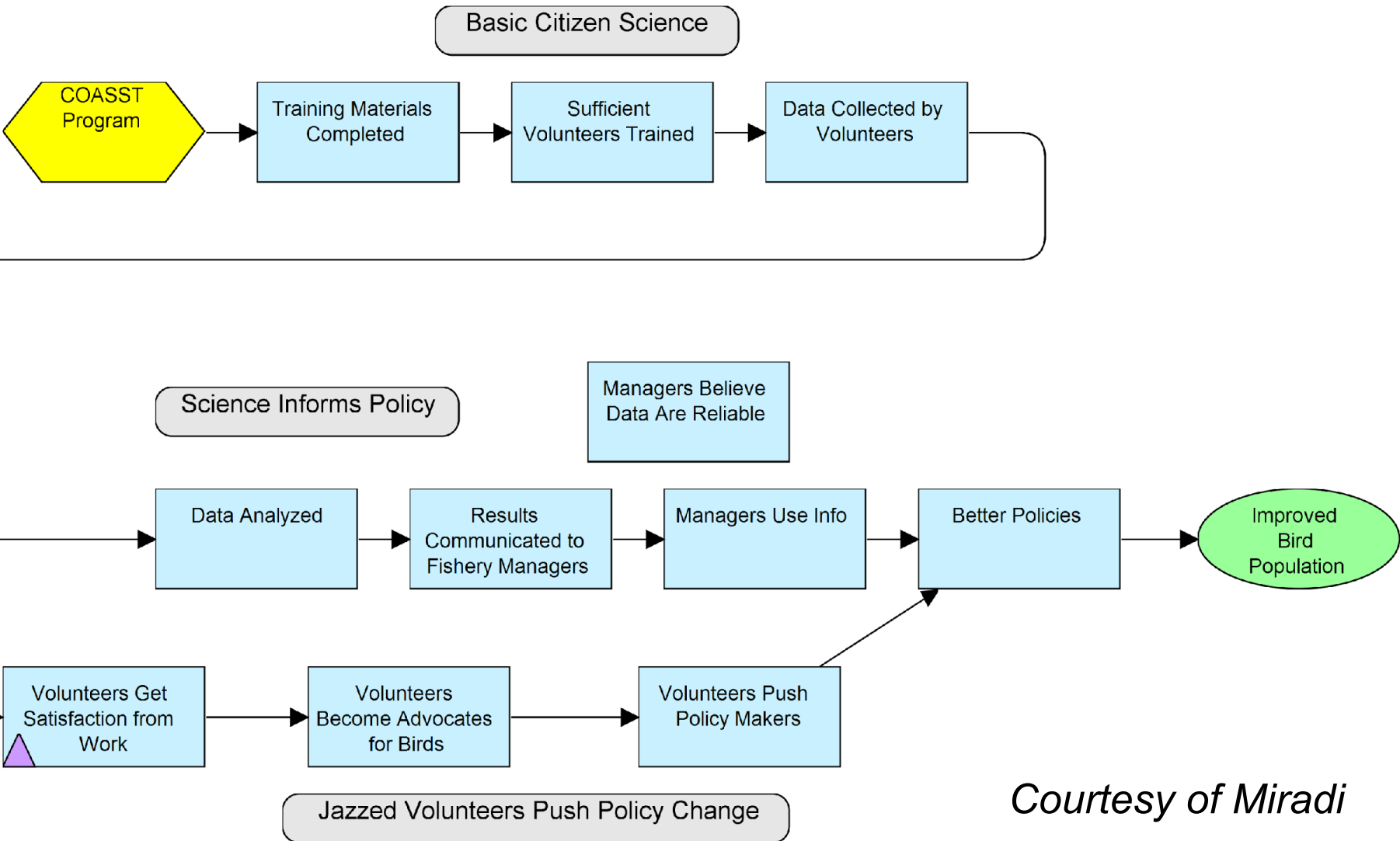
Testing Assumptions >> Results

“A results chain is a tool that shows how a project team believes a particular **action** it takes will lead to some desired **result**. More specifically, for conservation projects, a results chain represents a team’s **assumptions** about how project or program **strategies** will contribute to reducing important threats, **leading to the conservation** of priority targets.”

-- *Foundations of Success*



Closing



Fundamental Questions

- What should our conservation goals be and how do we measure progress in reaching them?
- How can we most effectively take action to achieve conservation?
- **How can we do conservation better?**

Salafsky et al. 2002, Conservation Biology

Strengths Analysis

Framework

**Community,
Policy
Outcomes**

Local expertise Adaptive management Social capital Conflict resolution Policy & advocacy

(Bonney et al. 2009)

**Research,
Education
Outcomes**

Knowledge of global systems Spatial/temporal coverage Data & publications Outreach & exposure

Planning for Success

Adaptive management cycle

- Build evaluation into program design
- Align goals – outcomes – activities
- Identify measureable indicators
- Measure change at multiple points in time
- Work with social scientists/evaluators
- Invest in capacity to evaluate what is important, not just urgent
- **Document! Document! Document!**

Margoluis et al. 2009, Bliss 2001



Thank you!

tina.phillips@cornell.edu



Copyright fsong